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**Earth Venture Continuity – 1**  
**Technical, Management, and Cost Evaluation**  
**Pre-Proposal Web Conference**

**Third Stand Alone Missions of Opportunity Notice**  
**Announcement of Opportunity NNH17ZDA0040,**  
**Earth Venture Continuity - 1**  
**Program Element Appendix N**  
**February 28, 2019**

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# Outline

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EVC-1 PEA N

TMC (Technical, Management, and Cost) Evaluation

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# Introduction

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## Purpose of this Presentation

1. Present a short overview of the Technical, Management and Cost (TMC) Evaluation of proposals submitted as a result of the Earth Venture Continuity-1 (EVC-1) Program Element Appendix (PEA) N of the Third Stand Alone Missions of Opportunity Notice (SALMON-3) Announcement of Opportunity (AO).
2. Discuss some EVC-1 PEA N sections
3. Point to reference documents
4. Answer questions

Important Note: The EVC-1 PEA N is an appendix to the SALMON-3 AO. All proposers must read the PEA & the SALMON-3 AO carefully, and all proposals must comply with the requirements and constraints contained within the two documents.



# EVC-1 PEAN



# EVC-1 PEA N

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## **EVC-1 Flight Options: PEA Section 2.3**

EVC-1 investigations may be proposed as a Focused Mission of Opportunity (FMO) or a Small Complete Mission (SCM), as detailed in the SALMON 3 AO, Sections 2.3 and 5.1. Proposal options include:

- FMO (JPSS): The PI is responsible for developing and delivering an instrument that is compatible with National Oceanic and Atmospheric Administration (NOAA) requirements for flight on a Joint Polar Satellite System (JPSS) spacecraft. The instrument and all associated project costs and the one year of operations are included under the PI-Managed Mission Costs (PIMMC). NASA will fund accommodations to integrate the payload to the JPSS spacecraft outside of the PIMMC.
- FMO (Hosted Payload): The PI is responsible for the instrument, ground system, and hosting arrangement, and the one year of operations. The instrument, ground system, and all associated project development costs and the one year of operations are included under the PIMMC. NASA will fund hosting services and accommodations to integrate the payload to the host outside of the PIMMC.
- SCM: The PI is responsible under the PIMMC for providing the observing system hardware, including instrument(s), spacecraft and ground system, as well as all associated project development costs and one year of operations. In addition, the PI must identify arrangements and costs for access to space, including all necessary launch services, in the proposal. However, costs associated with access to space will be covered by NASA outside the PIMMC.

NASA has not identified specific cost constraints for the FMO accommodations and hosting services or the SCM access to space. The selecting official will consider these costs as part of the programmatic factors described in Section 6.2.



# EVC-1 PEA N

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## **Government Furnished Equipment: PEA Section 4.2**

Proposers can assume that all of the government-owned equipment and technical information that resulted from the cancelled RBI project is available for their use if their proposal is accepted. Proposed investigations that require the use of the RBI hardware/information should identify in detail and justify the material and/or information desired. The decision to propose the use of RBI hardware/information is entirely at the discretion of the proposer. If a proposal that identified required RBI hardware/information is selected, the identified hardware/information will be transferred to the selected proposal team as GFE. Information concerning this hardware/information may be found in the EVC-1 Library. NOTE: Release of RBI information to proposers is subject to NASA's Export Control Program and may not be available to all proposers.

Requirement N-1: Proposed investigations that require the use of RBI hardware and/or information shall identify in detail the hardware and/or information desired and justify its use.



# EVC-1 PEA N

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## **Payload Risk Classification: PEA Section 4.4.3**

This opportunity solicits proposals for science investigations requiring the development and operation of space-based payload(s) of Class C risk classification (as defined in NPR 8705.4, Risk Classification for NASA Payloads; found in the EVC-1 Library).



# EVC-1 PEA N

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## **Classified Materials : PEA Sec 5.2.1 supersedes SALMON-3, Sec 5.9.4**

In order to increase the capabilities of investigations proposed in response to this PEA, while minimizing the development and operations risks within the PIMMC, proposers may choose to leverage technology with classified heritage that was developed by other institutions and agencies as well as technology developed by NASA and NASA-funded partners. NASA allows 3 options to support heritage claims from classified programs.

### Delivery to NASA

The delivery to NASA option of a classified appendix regarding heritage requires delivery to NASA Headquarters (HQ) separately from the proposal. A single copy of the classified appendix regarding heritage must be submitted along with a cover letter referencing the submitted proposal by name, PI, and proposing organization.

### Delivery in Place

Proposers may choose to utilize the option for "delivery in place" of the classified appendix regarding heritage, where the classified material is not delivered to NASA but is kept at the point of origin.

### Sponsor Verification

Proposals that include technologies with classified heritage may utilize sponsor verification. This option is only available if the sponsor organization is not a team member in the proposal. Such proposals would only reference classified materials, including associated cost basis of estimates; the materials would not to be provided to NASA in any format. In lieu of a direct review of the classified materials, the evaluation panel will compile a list of questions regarding claims made in the proposal that need to be substantiated by the classified material. The list would be sent to the sponsor of the classified programs who must verify that the claims are supported.

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## **Scientific/Technical Evaluation Factors: PEA Section 6.1**

Proposals are evaluated according to the evaluation criteria set forth in Section 7.2 of the [SALMON-3 AO](#), subject to the modifications listed below.

- The Intrinsic Science, Exploration or Technology Merit of the Proposed Investigation is weighted at 30%.
- The Experiment Science, Exploration, or Technology Implementation Merit and Feasibility of the Proposed Investigation is weighted 40%.
- The Technical, Management and Cost Feasibility of the Proposed Investigation Implementation is weighted 30%.
- The evaluation of the Experiment Science Implementation Merit and Feasibility of the Proposed Investigation includes additional evaluation factors, Factors B-8 and B-9 (refer to PEA).
- The evaluation of the Technical, Management and Cost Feasibility of the Proposed Investigation Implementation includes an additional evaluation factor, Factor C-6 (see slide 16)



# TMC Evaluation



# TMC Evaluation

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## Evaluation Criteria

Evaluation Criteria from Section 7.2 of the SALMON-3 AO:

1. Intrinsic Science, Exploration, or Technology Merit of the Proposed Investigation (Science Panel);
2. Experiment Science, Exploration, or Technology Implementation Merit and Feasibility of the Proposed Investigation (Science Panel);
- 3. TMC Feasibility of the Proposed Investigation Implementation (TMC Panel).**

Weighting: the first criterion is weighted at approximately 30%; the second criterion is weighted at approximately 40% and third criterion are weighted at approximately 30%.

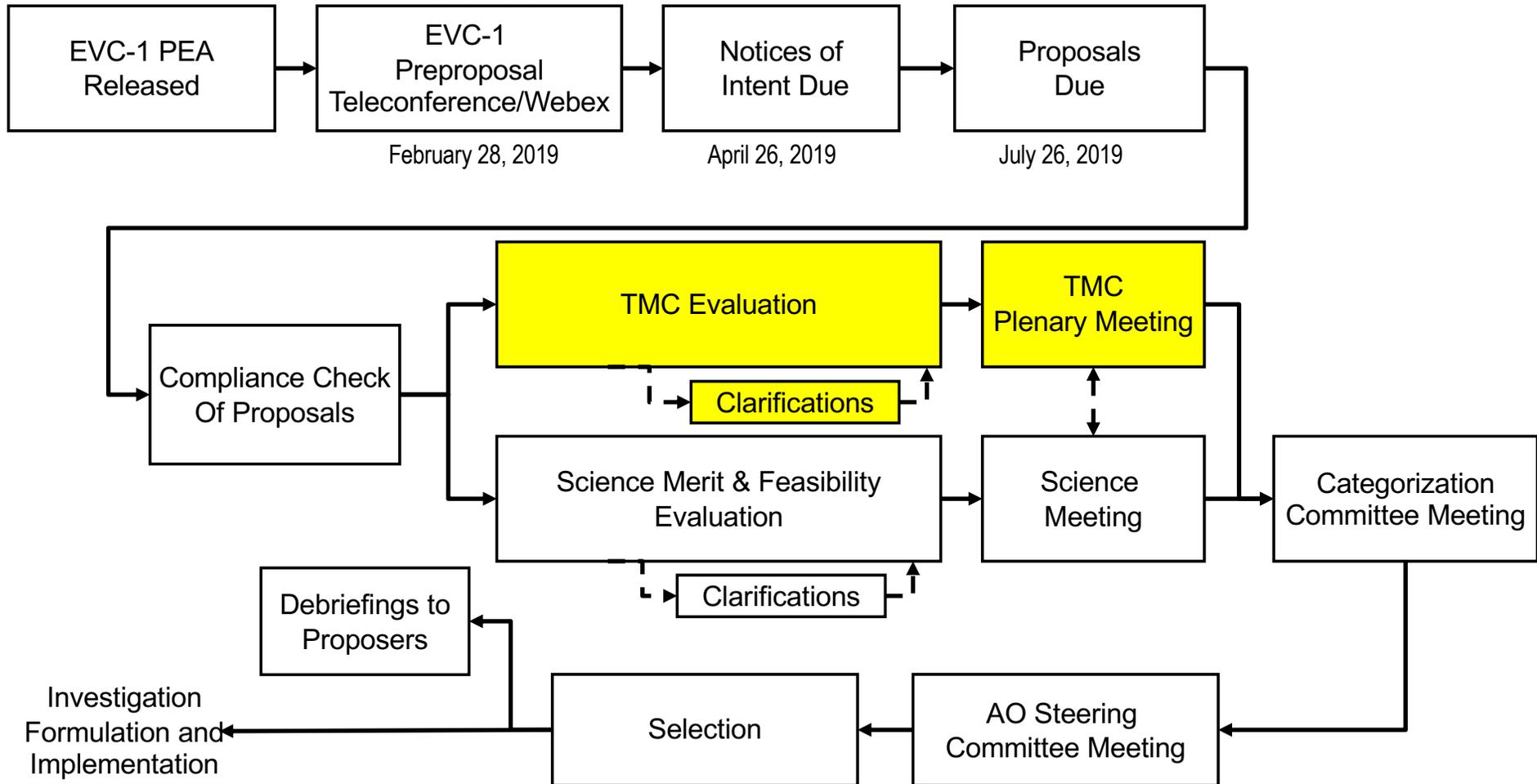
**TMC Evaluation:** The technical and management approaches of all submitted investigations will be evaluated to assess the likelihood that they can be successfully implemented as proposed, including an assessment of the likelihood of their completion within the proposed cost and schedule.



# TMC Evaluation

## EVC-1 PEA N Solicitation, Evaluation and Selection Flow

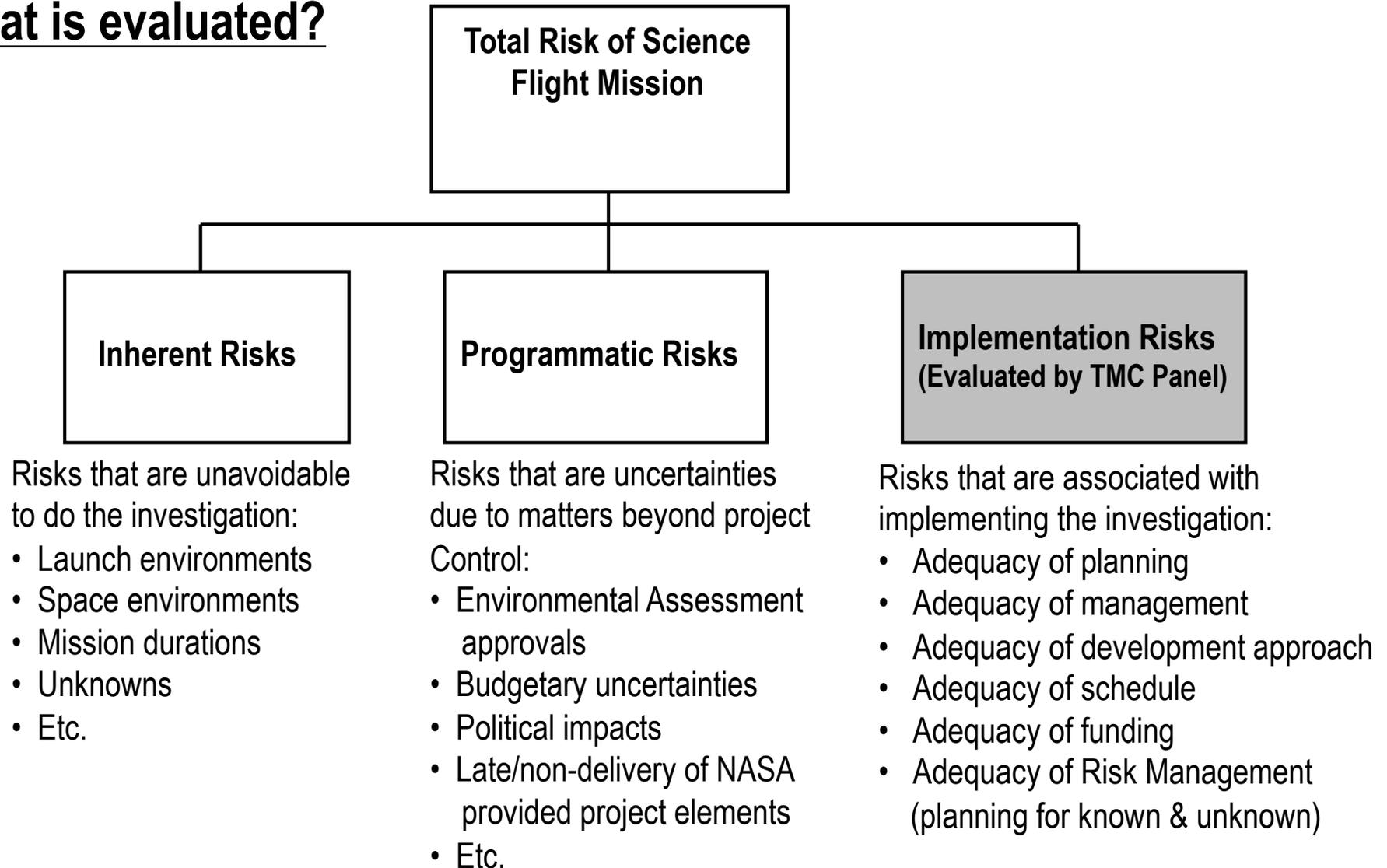
You are Here!!!





# TMC Evaluation

## What is evaluated?





# TMC Evaluation

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## TMC Evaluation Purpose and Principles

TMC evaluation purpose: to assess the likelihood that the submitted investigations' technical and management approaches can be successfully implemented as proposed, including an assessment of the likelihood of their completion within the proposed cost and schedule.

- Basic Principles:
  - It is assumed that the proposer is the expert on his/her proposal.
  - Proposer's task is to demonstrate that the investigation implementation risk is low.
  - TMC panel's task is to try to validate proposer's assertion of low risk.
- Merit is to be assessed on the basis of material in the proposal. All Proposals are evaluated to identical standards and not compared to other proposals.
- TMC Panels consist of evaluators who are experts in the factors that they evaluate.
- TMC Panels develop findings for each proposal - Findings: "As expected" (no finding), "above expectations" (strengths), "below expectations" (weaknesses). Risk Ratings should reflect the written strengths and weaknesses.
- The Cost Analysis is integrated into overall Risk Rating.
- Proposal Risk Assessment: Proposals are based on Pre-Phase-A concepts; TMC Risk Assessments give appropriate benefit of the doubt to the Proposer.



# TMC Evaluation

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## **TMC Evaluation Factors from Section 7.2.4 of the SALMON-3 AO**

Factors C1 – C5: TMC Feasibility of the Proposed Investigation Implementation: Please refer to Section 7.2.4 of the SALMON-3 AO for details. These factors are evaluated as applicable for each proposed investigation.

- Factor C-1. Adequacy and robustness of the instrument implementation plan.
- Factor C-2. Adequacy and robustness of the investigation design and plan for operations.
- Factor C-3. Adequacy and robustness of the flight systems. (*SCM Only*)
- Factor C-4. Adequacy and robustness of the management approach and schedule, including the capability of the management team.
- Factor C-5. Adequacy and robustness of the cost plan, including cost feasibility and cost risk.



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## **Additional TMC Evaluation Factor for EVC-1: PEA Section 6.1**

The evaluation of the Technical, Management and Cost Feasibility of the Proposed Investigation Implementation includes an additional evaluation factor, Factor C-6:

Factor C-6. EVC specific factor. This factor includes consideration of innovations in design or processes that reduce cost, of the potential cost of future copies of the proposed observing system that will be necessary to maintain measurement continuity in the future, of the design features that facilitate the accommodation of a proposed instrument on either the proposed platform or a JPSS platform as appropriate, of features (such as reliance on easily available components) enhancing the producibility of the instrument and possible future copies, and of design features which would facilitate cost-reducing or capability-enhancing technology infusion in future copies.



# TMC Evaluation

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## TMC Panel Evaluation Findings Definitions

- **Major Strength:** A facet of the implementation response that is judged to be well above expectations and can substantially contribute to the ability of the project to meet its technical requirements on schedule and within cost.
- **Minor Strength:** A strength that is worthy of note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.
- **Major Weakness:** A deficiency or set of deficiencies taken together that are judged to substantially weaken the project's ability to meet its technical objectives on schedule and within cost.
- **Minor Weakness:** A weakness that is sufficiently worrisome to note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.

Note: Findings that are considered “as expected” are not documented in the Form C.

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# TMC Evaluation

## TMC Cost Analysis Cost Threat Matrix

The likelihood and cost impact, if any, of each weakness is stated as “This finding represents a cost threat assessed to have an Unlikely/Possible/Likely/Very Likely/Almost Certain likelihood of a Very Minimal/Minimal/Limited/Moderate/Significant/Very Significant cost impact being realized during development and/or operations, **which results in a reduction from the proposed unencumbered reserves.**”

- The likelihood is the probability range that the cost impact will materialize.
- The cost impact is the best estimate of the range of costs to mitigate the threat.

The cost threat matrix, below, is populated by the cost estimator with dollar amounts of the expected cost impact.

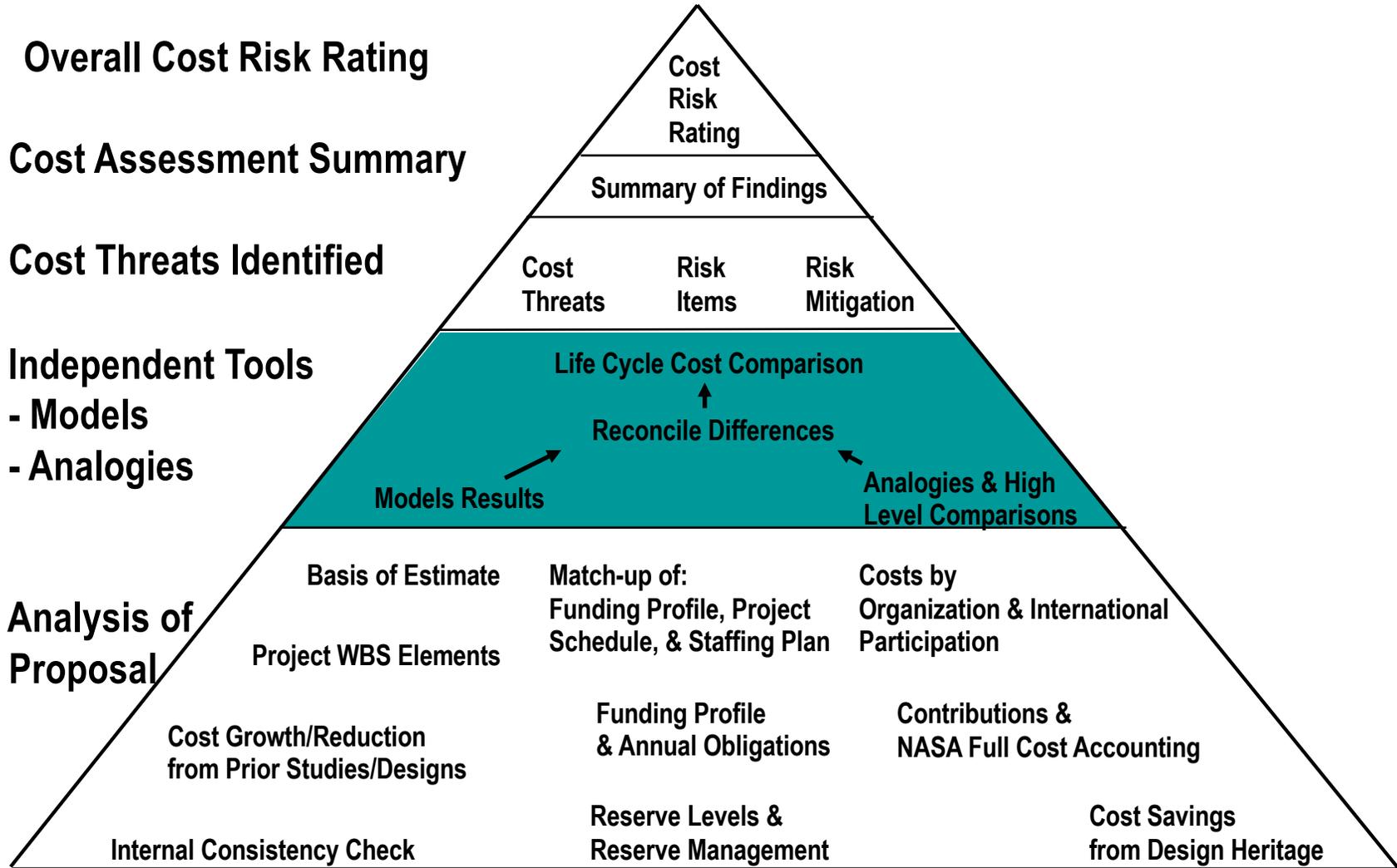
		Cost Impact (CI, % of PI-Managed Mission cost to complete Phases A/B/C/D or % of Phase E not including unencumbered cost reserves)					
		Very Minimal (1% < CI ≤ 2.5%)	Minimal (2.5% < CI ≤ 5%)	Limited (5% < CI ≤ 10%)	Moderate (10% < CI ≤ 15%)	Significant (15% < CI ≤ 20%)	Very Significant (CI > 20%)
Likelihood (L, %)	Almost Certain (L > 80%)						
	Very Likely (60% < L ≤ 80%)						
	Likely (40% < L ≤ 60%)						
	Possible (20% < L ≤ 40%)						
	Unlikely (L ≤ 20%)						



# TMC Evaluation

## TMC Cost Analysis Process Steps

5. Overall Cost Risk Rating
4. Cost Assessment Summary
3. Cost Threats Identified
2. Independent Tools
  - Models
  - Analogies
1. Analysis of Proposal





# TMC Evaluation

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## **TMC Cost Risk Definitions (1 of 4)**

The three criteria below are indicators of Cost Risk. Evaluators must consider these criteria and other relevant information (e.g., cost model applicability, uncertainty of the cost models error bars, effect of cost issues that fall below the minimum cost threat threshold, likelihood of cost impacts, mitigating factors such as major strengths, etc.) together with their judgement in determining the appropriate Cost Risk for a particular investigation.

Three criteria are considered for the determination of the Cost Risk for a proposed investigation; 1) The level of unencumbered reserves after any reduction by TMC identified cost threats; 2) The comparison of proposed cost with the TMC Base Independent Cost Estimate considering the appropriate error bars; and 3) The proposed cost, including reserves, supported by material in the proposal.

Appropriate Cost Reserves are defined as the minimum unencumbered reserves required by the Announcement of Opportunity (AO), or higher as judged by the TMC evaluation panel based on the justification provided by the PI (Principal Investigator). Unencumbered cost reserves higher than the minimum AO requirement may be necessary for some investigations, such as those requiring specific technology maturation.



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## TMC Cost Risk Definitions (2 of 4)

### Low Risk

- No cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost and the cost of all modelled lower Work Breakdown Structure (WBS) levels are greater than or equal to the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is very well supported by the information in the proposal.

### Low/Medium Risk

- No cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost and the cost of most modelled lower WBS levels are greater than or equal to the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is well supported by the information in the proposal.



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## TMC Cost Risk Definitions (3 of 4)

### Medium Risk

- Cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost or the cost of most modelled lower WBS levels are greater than or equal to the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is mostly supported by the information in the proposal.

### Medium/High Risk

- Cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost or the cost of most modelled lower WBS levels are lower than the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is not well supported by the information in the proposal.



# TMC Evaluation

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## TMC Cost Risk Definitions (4 of 4)

### High Risk

- Cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves significantly below the Appropriate Cost Reserves.
- The proposed investigation cost and the cost of most modelled lower WBS levels are significantly lower than the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is not supported by the information in the proposal.



# TMC Evaluation

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## Potential Major Weaknesses Clarification Process

NASA is requesting clarifications of Potential Major Weaknesses (PMWs) identified by the evaluation panels in all three criteria; Intrinsic Science Merit of the Proposed Investigation, Experiment Science Implementation Merit and Feasibility of the Proposed Investigation, and TMC Feasibility of the Proposed Investigation Implementation.

- NASA requests such clarification uniformly, from all proposers.
- All requests for clarification from NASA and the proposers' responses are in writing.
- The ability of proposers to provide clarification to NASA is extremely limited, as NASA does not intend to enter into discussions with proposers.
- PIs whose proposals have no PMWs are informed that no PMWs have been identified at that time.
- The form of the clarifications is strictly limited to a few types of responses:
  - Identification of the locations in the proposal (page(s), section(s), line(s)) where the PMW is addressed.
  - Noting that the PMW is not addressed in the proposal.
  - Stating that the PMW is invalidated by information that is common knowledge and is therefore not included in the proposal.
  - Stating that the analysis leading to the PMW is incorrect and identifying a place in the proposal where data supporting a correct analysis may be found.
  - **Stating that a typographical error appears in the proposal and that the correct data is available elsewhere inside of the proposal.**

The PIs are given at least 24 hours to respond to the request for PMW clarification. Any response that goes beyond the five forms of clarification stated above will be deleted and not shown to the evaluation panel.

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# TMC Evaluation

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## TMC Risk Ratings

**TMC Evaluation:** to assess the likelihood that the submitted investigations' technical and management approaches can be successfully implemented as proposed, including an assessment of the likelihood of their completion within the proposed cost and schedule.

Based on the narrative findings, each proposal is assigned one of three risk ratings, defined as follows:

- **LOW Risk:** There are no problems evident in the proposal that cannot be normally solved within the time and cost proposed. Problems are not of sufficient magnitude to doubt the proposer's capability to accomplish the investigation well within the available resources.
- **MEDIUM Risk:** Problems have been identified, but are considered within the proposal team's capabilities to correct within available resources with good management and application of effective engineering resources. Investigation design may be complex and resources tight.
- **HIGH Risk:** One or more problems are of sufficient magnitude and complexity as to be deemed unsolvable within the available resources.

Note: Only Major Findings are considered in the risk rating.

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## EVC-1 Acquisition Homepage

The EVC-1 Acquisition Homepage is found at <http://essp.larc.nasa.gov/EVC-1/>.

## EVC-1 Library

Reference documents are available at [http://essp.larc.nasa.gov/EVC-1/evc-1\\_library.html](http://essp.larc.nasa.gov/EVC-1/evc-1_library.html)

- TRL 6 Examples document
- EVI Common Causes of Major Weaknesses document
- Clouds and the Earth's Radiant Energy System (CERES)
- Recommended Measurement and Instrument Characteristics for an Earth Venture Continuity Earth Radiation Budget Instrument (Updated 11/20/2018)
- Continuity of NASA Earth Observations from Space: A Value Framework, National Academies of Sciences, Engineering, and Medicine report

Information on JPSS and its interfaces

RBI hardware/information



# Questions

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All questions regarding the EVC-1 PEAN MUST be addressed to:

David Considine, Ph.D.  
Earth Venture Continuity - 1 Program Scientist  
Earth Science Division  
Science Mission Directorate  
NASA Headquarters  
Washington, DC 20546-0001

Preferably by email at:  
david.b.considine@nasa.gov  
Subject line to read "EVC-1 PEAN"